

CLAIMS

Having thus described our invention, what we claim as new and desire to secure by Letters Patent are:

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1. Stamp device for printing a pattern on a surface of a substrate having a two-sided rigid carrier layer providing on it's first side a patterned layer made of a first material and being combined on it's second side with a soft layer made of a softer material than said first material.

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2. Stamp device for printing a pattern on a surface of a substrate comprising a two-sided rigid carrier layer providing on it's first side a patterned layer made of a first material and a contact means having at least one soft layer made of softer material than said first material for contacting the second side of said carrier layer.

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3. Stamp device according to claim 1, wherein said carrier layer describes an x-y-plane in which said carrier layer is rigid and said carrier layer is flexible in a direction perpendicular to said x-y-plane.

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4. Stamp device according to claim 1, wherein said carrier layer is a metal foil or a thin glass or quartz substrate.

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5. Stamp device according to claim 1, wherein said patterned layer provides structures having structure depths being smaller than the thickness of said soft layer.

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6. Stamp device according to claim 5, wherein said patterned layer being of a thickness greater than said structure depths and said soft layer being of a thickness greater than the thickness of said patterned layer.

7. Stamp device according to claim 1,
wherein said soft layer has a first compression modulus e_1 and said patterned layer has a second compression modulus e_2 and where $e_1 < e_2$ and preferably $e_1 < e_2/5$.

5 8. Stamp device according to claim 1,
wherein said soft layer provides a backside onto which force is directable by a press means for contacting said patterned layer onto said surface of said substrate.

9. Stamp device according to claim 8,
10 wherein said press means is a roller element like a cylindrical press element having at least partially a cylindrical surface.

10. Stamp device according to claim 2,
15 wherein said contact means is a roller element like a cylindrical press element having at least partially a cylindrical surface.

11. Stamp device according to claim 1,
wherein said patterned layer provides at least one force transducer zone for monitoring a force induced load acting between said stamp and said substrate.

20 12. Stamp device according to claim 11,
wherein said force transducer zone provides a patterned structure surrounding at least an area free of structures and in said area free of structures additional structures are provided which narrows the area free of structures in at least one direction.

25 13. Stamp device according to claim 11,
wherein said force transducer zone provides a patterned structure surrounding at least an area free of structures and in said area free of structures additional structures, like linear structures, are provided which divide said area free of structures in at least two sections.

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14. Stamp device according to claim 13,

wherein at least two linear structures being arranged perpendicular to each other and dividing said area free of structures at least into three sections.

5 15. Stamp device according to claim 11,

wherein said force transducer zone is placed in an area near an edge of said patterned layer.

16. Stamp device according to claim 1,

wherein said patterned layer provides patterned structures for printing said surface of said substrate and said patterned structures being separated from each other by areas free of structures and in said areas free of structures support structures, like posts or lines, are provided for preventing said areas free of structures from sagging and contacting said substrate by applying a load onto said stamp device.

5 17. Stamp device according to claim 16,

wherein said support structures having maximally the same structure depth as said patterned structures and being of the same material or of harder material like PMMA.

18. Stamp device according to claim 1,

wherein said patterned layer provides patterned structures for printing said surface of said substrate and said patterned structures being separated from each other by areas free of structures and in said areas free of structures the first material of said patterned layer is at least partially omitted forming a recess for preventing said areas free of structures from sagging and contacting said substrate by applying a load onto said stamp device.

19. Stamp device according to claim 2,

wherein said patterned layer provides patterned structures for contacting said surface of said substrate and said patterned structures being separated from each other by areas free of structures and in said areas free of structures the first material of said patterned layer is at least partially omitted forming a recess, and

wherein at least one passage channel breaks through said carrier layer into said recess for creating a fluidic or gas network between said surface of said substrate and said stamp.

20. Stamp device according to claim 19;

5 wherein at least two passage channels are provided, one inflow channel and an other outflow channel for a fluid or gaseous media.

21. Stamp device according to claim 19,

10 wherein at least two layers of said fluidic or gas network are stacked on top of each other to allow formation of multidimensional networks that can give access to a multitude of substances to a multitude of locations without level intersections.

22. Stamp device according to claim 1,

15 wherein said patterned layer as well the surface of said substrate comprising self-aligning means for an accurate relative positioning during the printing process.

23. Stamp device according to claim 22,

20 wherein said self-aligning means comprises lock and key elements with lock elements of a constant shape and distance and key elements of variable shape being smaller than said lock elements and getting larger for fitting without any mismatch into said lock elements.

24. Stamp device according to claim 23,

wherein said lock and key elements having tapered flanks.

25 25. Stamp device according to claim 23,

wherein said lock and key elements being arranged in a row along which said patterned layer and said substrate being brought into contact.

26. Stamp device according to claim 23,
wherein said patterned layer comprises said key elements and said surface of said substrate
comprises said lock elements.

5 27. Stamp device according to claim 22,
wherein said key elements are made from the same material as the hard support posts
(PMMA).

10 28. Stamp device according to claim 1,
wherein said patterned layer is stretched to compensate thermal, chemical, and/or mechanical
induced deformation of said patterned layer to result in accurate prints.

5 29. Stamp device according to claim 28,
wherein said first material of said patterned layer has a thermal expansion coefficient being
greater than the thermal expansion coefficient of said rigid carrier layer.

20 30. Stamp device according to claim 19,
wherein said areas free of structure and connected to a closed gaseous network are
pressurized through at least one passage channel to prevent those areas from sagging and
contacting said substrate by applying a load onto said stamp device.